

OOP-LAB
ASSIGNMENT 3

GROUP 6

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Code is as follows:

```
#include <bits/stdc++.h>

#include <math.h>

using namespace std;

class polar_coordinates
{
public:
    float Length; // r in normal units
    float Angle; // theta in degrees
    double x_coord;
    double y_coord;

    polar_coordinates(float length, float angle)
    { // Constructor

        Length = length;
```

```

    Angle = angle;

    // converting degrees to radians
    double x = Angle * 3.14159 / 180;

    // x * 180/3.14 = Radians

    x_coord = Length * cos(x); // cos and sin takes inputs in radian form
    y_coord = Length * sin(x);
}

friend void operator-(polar_coordinates &p1, polar_coordinates &p2);
};

void operator-(polar_coordinates &p1, polar_coordinates &p2)
{
    p1.x_coord -= p2.x_coord;
    p1.y_coord -= p2.y_coord;

    double Angle_result = atan(abs(p1.y_coord) / (p1.x_coord)); // atan returns answer in
    radian form

    cout << "The resultant magnitude after subtraction is " << sqrt((p1.x_coord * p1.x_coord)
    + (p1.y_coord * p1.y_coord)) << endl;

    cout << "The resultant angle after subtraction is " << (180 * Angle_result) / M_PI << endl;
    // conversion to degree

    cout << "\n";
}

void operator*(polar_coordinates &p1, polar_coordinates &p2)
{
    double x_angle = p1.Angle + p2.Angle;

```

```

    if (x_angle >= 360)
    { // for sin and cos (370 == 10)
        x_angle -= 360;
    }

    cout << "The resultant Magnitude after multiplication is " << p1.Length * p2.Length <<
endl;
    cout << "The resultant angle after multiplication is " << x_angle << endl;
    cout << "\n";
}

int main()
{
    float r, a, r1, a1;
    cout << " Enter radius and angle : ";
    cin >> r >> a;

    cout << "Enter second coordinates :";
    cin >> r1 >> a1;

    polar_coordinates P1 = polar_coordinates(r, a);
    polar_coordinates P2 = polar_coordinates(r1, a1);

    cout << "\n";

    cout << "Using overloaded * to multiply two objects of polar." << endl;

    P1 * P2;

```

```
cout << "\n";
```

```
cout << "Using overloaded - operator (binary) to subtract two objects of polar." << endl;
```

```
P1 - P2;
```

```
return 0;
```

```
}
```

Output of the code is:

```
PS D:\Python Programs\C Programs\Lab> .\polar_coordinates.exe
Enter magnitude and angle of first polar objects : 10 60
Enter magnitude and angle of second polar object : 5 30

Using overloaded * to multiply two objects of polar in the form of P1 * P2 (where P1,P2 are polar objects)
The resultant Magnitude after multiplication is 50
The resultant angle after multiplication is 90

Using overloaded - operator (binary) to subtract two objects of polar in the form of P1 - P2 (where P1,P2 are polar objects)
The resultant magnitude after subtraction is 6.19657
The resultant angle after subtraction is 83.7939
```